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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/802,481	03/16/2004	Ronald N. Perry		4085

7590 03/24/2005

Patent Department
Mitsubishi Electric Research Laboratories, Inc.
201 Broadway
Cambridge, MA 02139

EXAMINER	
SINGH, DALIP K	

ART UNIT	PAPER NUMBER
2676	

DATE MAILED: 03/24/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/802,481	PERRY ET AL.	
	Examiner	Art Unit	
	Dalip K Singh	2676	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *28 June 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-23* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *16 March 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *5/26/04;6/28/04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-3 & 22 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 6,801,203 to Hussain.

a. Regarding claim 1, Hussain **discloses** defining a rendering request (...graphics sub-system 120 contains a graphics pipeline 122...processing a serial of display instructions...to render graphics primitives...col. 5, lines 8-15); querying a cache to determine a cached element (...a graphics pipeline...and a pixel cache...graphics pipeline 301...utilizes a pixel cache 360 to cache incoming pixel data...col. 6, lines 45-58); sending the cached element to a starting stage of a rendering pipeline (...pre-fetch FIFO 350 is coupled to pixel cache 360, which is used to store tiles of pixel data when the data is retrieved from memory 388...pixel data is...stored within...cache 360 before it is needed for...the pipeline operation...col. 7, lines 4-51, Fig. 3); and sending an output of the starting stage to an input of a next stage of the rendering pipeline (...graphics primitives are traversed to generate information for the corresponding pixels...col. 7, lines 35-51;...flow diagram 600 illustrating steps for accessing a cache and..steps are described in terms

of a graphics pipeline...upon a request for certain pixels from the graphics pipeline...col. 8, lines 38-65).

b. Regarding claim 2, Hussain **discloses** wherein an output of a stage of the rendering pipeline is sent to the cache (See Fig. 3, where tag compare unit 310, pre-fetch FIFO 350 and pixel cache 360 are shown interconnected).

c. Regarding claim 3, Hussain **discloses** a set of caches (color cache 245, s/z cache 255, texture cache 265, See Fig. 2).

d. Regarding claim 22, it is similar in scope to claim 1 above and is rejected under the same rationale.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 4-10, 14-21 & 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,801,203 to Hussain.

a. Regarding claims 4-8, the claim limitations recite the set of caches being a preprocessed shape descriptor cache, distance field cache, distance values cache, antialiased intensities cache and colorized image cache. The graphical data that these cache store are data specific to the pipeline implementation as described in the specification of this instant application. Hussain **discloses** storing graphical data

in different caches, such as color cache 245, s/z cache 255 and texture cache 265 (Fig. 2). Therefore, it would have been obvious to a person of ordinary skill in the art at the time invention was made to make use of Hussain's caches for the claimed limitation caches i.e., preprocessed shape descriptor cache, distance field cache, distance values cache, antialiased intensities cache and colorized image cache **because** they afford the same advantage i.e., faster memory access to graphical data.

b. Regarding claim 9, Hussain **discloses** graphical data being stored in different caches i.e., color, texture cache. Therefore, it would have been obvious to a person of ordinary skill in the art at the time invention was made to make use of Hussain's cache for claim limitation specific graphical data **because** a cache usage provides faster memory access to graphical data.

c. Regarding claim 10, wherein the distance values are combined prior to determination of an antialiased intensity, Hussain **discloses** the graphics pipeline manipulating the graphics primitives in order to produce the final pixel values of an image (...a graphics pipeline enables different graphics data to be processed concurrently, thereby generating graphics images...col. 1, lines 30-51). Therefore, it would have been obvious to a person of ordinary skill in the art at the time invention was made to make use of Hussain's pipeline to perform claimed limitations i.e., data values being combined **because** it provides for generating graphics images at a higher rate thus improving performance of a graphics systems.

d. Regarding claims 14-21, the claimed limitation recite rendering pipeline comprising a sequence of stages; wherein a particular stage processes the rendering request; wherein a particular stage determines a preprocessed shape descriptor; a distance field; distance values; antialiased intensities; and a colorized image. Hussain **discloses** the graphics pipeline manipulating the graphics primitives in order to produce the final pixel values of an image (...a graphics pipeline enables different graphics data to be processed concurrently, thereby generating graphics images...col. 1, lines 30-51). Therefore, it would have been obvious to a person of ordinary skill in the art at the time invention was made to make use of Hussain's pipeline to perform the determination of a preprocessed shape descriptor; a distance field; distance values; antialiased intensities; and a colorized image **because** it provides for generating graphics images at a higher rate thus improving performance of a graphics systems, one of the chief advantages of utilizing a pipeline operations.

e. Regarding claim 23, it is similar in scope to claim 1 above with the cache controller being **implicitly disclosed** by Hussain in the form of Tag compare unit 310 (See Fig. 3).

5. Claims 11-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,801,203 to Hussain as applied to claim 1 above and further in view of U.S. Patent No. 6,717,577 B1 to Cheng et al.

a. Regarding claim 11, Hussain **does not disclose** compressing cache elements. Cheng et al. **discloses** a vertex cache being utilized in a processing pipeline and

data being compressed for storage in the cache (...Fig. 1B shows a...3D graphics pipeline 116...a vertex cache 212...col. 5, lines 57-67; col. 6, lines 1-67;...the vertex data includes...compressed data streams...these various data formats can...be stored in the common vertex cache...and subsequently decompressed..for the graphics display pipeline...col. 3, lines 56-67). Therefore, it would have been obvious to a person of ordinary skill in the art at the time invention was made to modify Hussain invention with the feature "cache storage with compression" as taught by Cheng et al. **because** it results in saving memory space.

b. Regarding claim 12, Hussain **does not explicitly disclose** making use of hashing to access cache elements. Cheng et al. **implicitly** discloses hashing (...each primitive within primitive list 302 indexes corresponding vertices...a single vertex within vertex list 304 may be used by multiple primitives within primitive list...col. 8, lines 30-56;...any vertex component can be index-referenced...col. 6, lines 55-67; col. 7, lines 1-5). Therefore, it would have been obvious to a person of ordinary skill in the art at the time invention was made to modify Hussain invention with the feature "indexed arrays for cache elements" as taught by Cheng et el. **because** it results in efficient cache elements storage.

c. Regarding claim 13, Hussain-Cheng combination **fails to disclose** least recently used cache elements being discarded when the cache is full. Official notice is taken that both the concept and the advantages of discarding least recently used cached elements when a cache is full are well known and expected in the

design of cache are. Therefore, it would have been obvious to a person of ordinary skill in the art at the time invention was made to include "discarding of least recently used cache elements when the cache is full" as it provides for efficient cache operation by keeping most recently used cache elements, a fundamental design goal/basis of a cache.

Conclusion

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to **Dalip K. Singh** whose telephone number is **(571) 272-7792**. The examiner can normally be reached on Mon-Thu (8:00AM-6: 30PM) Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, **Matthew Bella**, can be reached at **(571) 272-7778**.

Any response to this action should be mailed to:

Commissioner of Patents and Trademarks

Washington, D.C. 20231

or faxed to: (703) 872-9314 (for Technology Center 2600 only)

Hand-delivered responses should be brought to Crystal Park II, 2121 Crystal Drive, Arlington, VA, Sixth Floor (Receptionist).

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Technology Center 2600 Customer Service Office whose telephone number is (703) 306-0377.

dks

March 18, 2005

Kee M. Tung
Primary Examiner